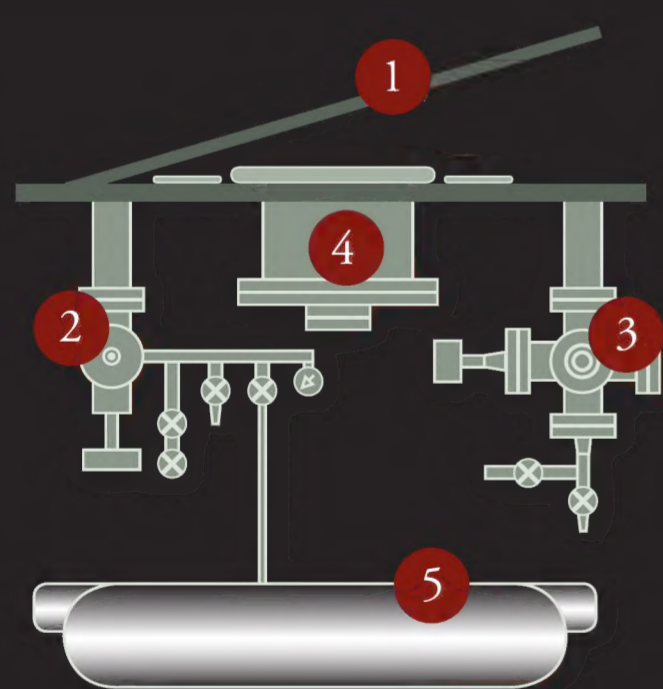


Making the case for conservation

The tip of the iceberg

Public viewing of the Declaration of Arbroath has only been made possible by an international partnership in conservation science and engineering technology involving the National Archives for Scotland, the Getty Conservation Institute and Heriot-Watt University. Although you will see very little of it as you pass through the exhibition, the document is housed in a special case designed to maintain a constant relative humidity and almost zero oxygen. Thanks to a special design pioneered by the Getty Conservation Institute, the chamber is able to “breathe” as the ambient temperature and atmospheric pressure vary (which, as we all know, happens quite a lot in Scotland).

The design shown in the diagram below (full diagram on next page) is a marriage between ultra-high vacuum technology and the latest thinking in conservation science. The target for the case was to control the relative humidity within a narrow range, and to ensure that the oxygen content in the case does not exceed 0.3%. This was done by making a hermetically-sealed box, purging with pure, humidified nitrogen, and providing a flexible compensating chamber whose volume can vary to accommodate any changes in external pressure and temperature to keep the pressure inside the chamber the same as it is on the outside. All machined parts are made from stainless steel and the frame for the case is made from custom-extruded aluminium alloy which has been anodised to give an unobtrusive appearance. The compensating chamber is made from a special oxygen barrier polymer film and the chamber atmosphere is further controlled using conservation grade sorbents for moisture and oxygen. In order to maximise visibility the chamber volume is around 200 litres and the compensating device can vary in volume between 0.4 and 35 litres.

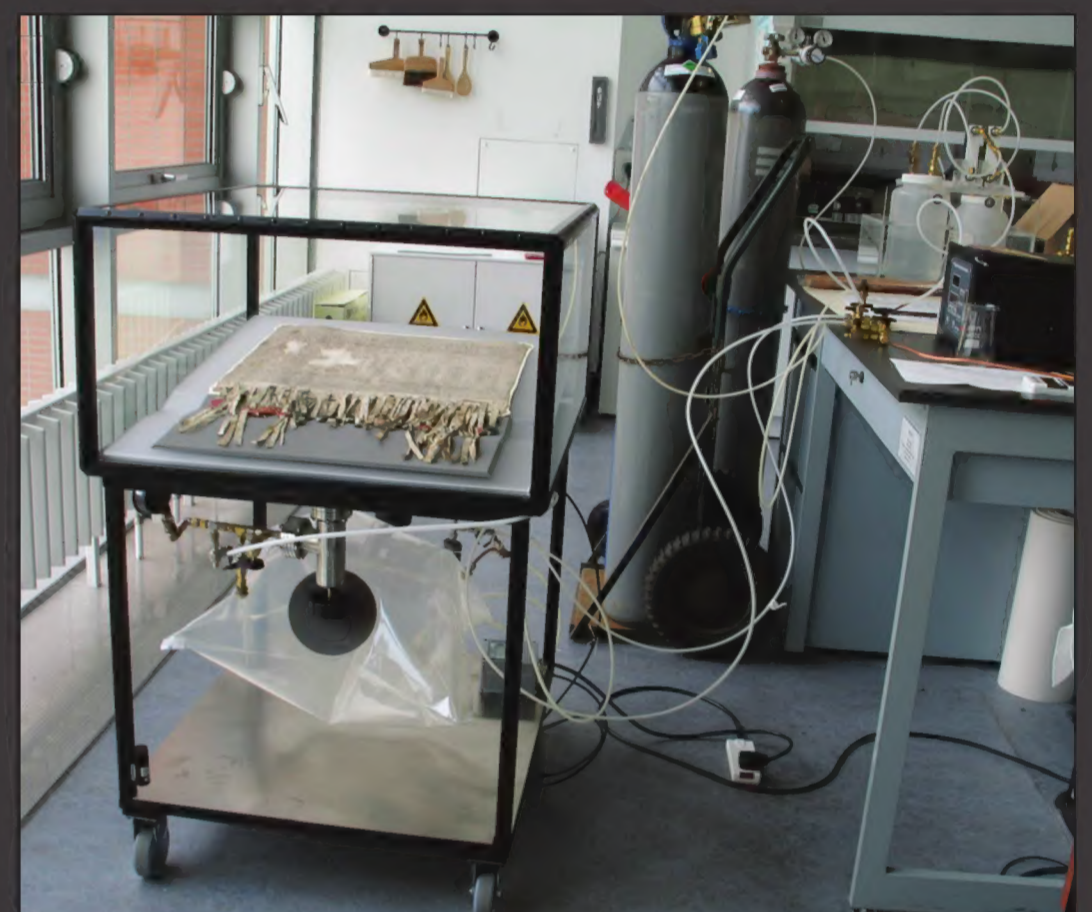


- 1 Document stand
- 2 Inlet ultra-high vacuum valve
- 3 Outlet ultra-high vacuum valve
- 4 Ultra-high vacuum access port
- 5 Flexible pressure compensation device

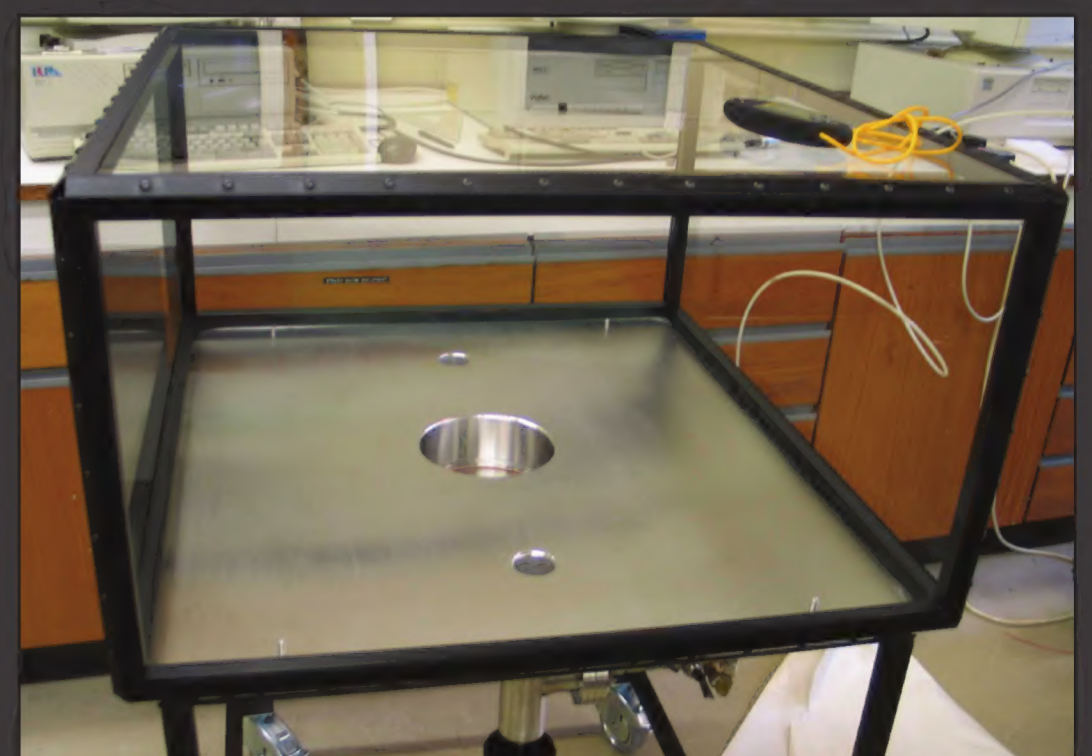
The atmosphere was conditioned after insertion of the document. This was only done after careful analysis of the characteristics of the case and the compensating device, making appropriate adjustments to eliminate any danger of damaging this important artefact.

Before release to the Scottish Parliament, conservators at the National Archives of Scotland assured themselves that its display would not compromise its condition.

Enjoy what you are about to see, and rest assured that Scotland's engineers and conservators, using the best advice in the world, have ensured that yours will not be the only generations who can see this treasured piece of Scotland's national heritage.



Fabrication was carried out at Heriot-Watt University's Brent Wilson Advanced Manufacturing Unit, which was chosen for its excellent machining facilities. Extrusions were supplied by the Getty Conservation Institute and were precision-cut to produce the frame. A stainless steel base plate was prepared by specialists Vacuum Generators, and the glass was laminated in order to provide an external anti-reflective coating, coupled with the highest clarity and toughness. Once fabricated, the case showed an oxygen leak rate of better than 0.5 parts per million per day, a factor of ten better than the specification.



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